

Remarks and Arguments

Claims 1-57 have been presented for examination. Claims 1, 15, 29, 43 and 57 have been amended.

Claims 15-28 have been rejected under 35 U.S.C. §101 for being drawn to non-statutory subject matter because the claimed method steps are not performed in a "tangible" manner. In response, claim 15 has been amended to specify that the method is "computer-implemented" as suggested by the examiner. It is believed that claims 15-28 now recite statutory subject matter in accordance with 35 U.S.C. §101.

Claims 1-57 have been rejected under 35 U.S.C. §112, second paragraph, as indefinite for reciting the phrase "that thread" which has an unclear antecedent basis. In response, claims 1, 15, 29, 43 and 57 have been amended to recite that each thread performs the actions recited in paragraph (B) (i)-(iii). Claim 1 is illustrative. It recites "... a mechanism that operates the threads in a manner that each thread:

- i) executes a task-finding routine ...
- ii) ... sets the contents of its associated status-word field to a value indicating it is inactive;
- iii) ... continues to search for a task using the task-finding routine, and, if it finds one, sets its associated status-word field contents to a value indicating that it is active before attempting to execute a found task; and
- iv) ... terminates its performance of the parallel-execution operation."

It is believed that any potential antecedent basis problem is thereby eliminated and that the claims are now in accordance with 35 U.S.C. §112, second paragraph.

Claims 1-5, 7-9, 11-19, 21-23, 25-33, 35-37, 39-47, 49-51 and 53-57 have been rejected under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 6,434,590 B1 (Blelloch, previously cited) in view of U.S. Patent Publication No. 2001/0025295 (Kawachiya, previously cited.) The Blelloch and Kawachiya references and the examiner's application of these references to the claims have been discussed previously. It has been argued previously that the claimed invention was directed towards a system for determining, in a system in which parallel threads are executing, when the processing of each thread is done. As claimed, each of a plurality of independent threads read each other's status-word fields and then terminate

themselves based on their own determination of when their processing is complete. It has also been argued that the Bleloch and Kawachiya patents both disclose systems in which a another process or set of processes, the assignment manager, both schedules the parallel threads, receives information for each thread and determines when the processing of each task is complete.

The examiner contends that the claims must be given their broadest reasonable interpretation consistent with the specification and that the broadest reasonable interpretation of the term “thread” used in the claims in a computer instruction. Consequently, the examiner concludes that Bleloch discloses program instructions, interpreted as “threads” that determine which tasks execute.

While applicants agree that a thread could consist of a single computer instruction, the term “thread” connotes other important characteristics. In particular, the term “thread” is a well-known term of art that means one or more computer instructions executing in a separate process with a context switch involved in changing execution from one thread to another. This is well-known and also discussed in the present specification at page 1, line 18 to page 2, line 12. Thus, while a single computer instruction could constitute a “thread”, the separate instructions of a single process could not constitute “threads” unless the execution of each instruction was accompanied by a context switch.

It is clear that the claims cannot read onto the Bleloch assignment manager by itself. In the discussion that follows, claim 1 will be used as an example; however, the other independent claims contain similar language and, thus, distinguish in the same manner as claim 1. In particular, claim 1 recites, in lines 8-11, that each thread finds tasks and executes them, that is, the same thread both finds tasks and executes them. The examiner points to Bleloch, column 12, lines 3-15, and column 13, lines 47-65. This section of Bleloch discusses an algorithm run by the scheduler in the assignment manager. While this section may indicate that the assignment manager “finds” tasks, it is clear that the assignment manager does not perform the tasks that is has “found”, as recited. Instead, the assignment manager makes the tasks available in a task queue in accordance with the scheduler algorithm and other processes (threads) running in the parallel processors take the tasks from the task queue and perform them as recited at

column 2, lines 43-51 and column 6, lines 29-46. There is no disclosure that the assignment manager removes tasks from the task queue and executes them.

The only interpretation that would allow claim 1 to read onto Blelloch is for some of the computer instructions in the assignment manager (instructions that determine which tasks to process) to be combined with some of the instructions in one of the processes running in the parallel processors (the instructions that perform the tasks) to form a combined “thread” that performs the recited tasks. Then for the next “thread”, the instructions in the assignment manager would have to be combined with the instructions in another of the processes running in the parallel processors. Applicant believes that such a claim interpretation is not reasonable and that no one skilled in the art would interpret claim 1 to read on Blelloch in this manner as it is clear that the assignment manager and the processes running in the parallel processors are separate (see, for example, Blelloch Figure 1.).

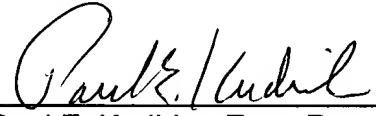
Combining Kawachiya with Blelloch would not change this analysis since, as previously described, Kawachiya is directed towards locking common data in a system with parallel threads, not with scheduling and terminating threads. Thus, its combination with Blelloch cannot change the basis thread scheduling arrangement disclosed in Blelloch.

In addition, claim 1 recites, in lines 21-24 (step iv) that, based on an examination of the status-words of other threads and the results of a search for additional tasks, each thread terminates itself. There is no teaching or suggestion that the Blelloch assignment manager terminates itself as recited, if it did, the entire operation of the Blelloch system would stop. See, for example, Blelloch, column 2, lines 57-60. Instead, it is clear that Blelloch assignment manager terminates the execution of other threads. See, for example, Blelloch, column 4, lines 53-59 and column 5, lines 6-10. Again, the only interpretation that would allow claim 1 to read onto Blelloch is for some of the computer instructions in the assignment manager to be combined with some of the instructions in the processes running in the parallel processors to form a combined “thread” that performs the recited tasks. Applicant believes that such a claim interpretation is not reasonable. Therefore, claim 1 and claims 15, 29, 43 and 57, which contain similar wording, patentably distinguish over the cited reference combination.

Claims 2-5, 7-9 and 11-14 depend, either directly or indirectly on claim 1 and incorporate the limitations thereof. Consequently, they distinguish over the cited references in the same manner as claim 1. Claims 16-19, 21-23 and 25-28 depend, either directly or indirectly on claim 15 and incorporate the limitations thereof. Consequently, they distinguish over the cited references in the same manner as claim 15. Claims 30-33, 35-37 and 39-42 depend, either directly or indirectly on claim 29 and incorporate the limitations thereof. Consequently, they distinguish over the cited references in the same manner as claim 29. Claims 44-47, 49-51 and 53-56 depend, either directly or indirectly on claim 43 and incorporate the limitations thereof. Consequently, they distinguish over the cited references in the same manner as claim 43.

In light of the forgoing amendments and remarks, this application is now believed in condition for allowance and a notice of allowance is earnestly solicited. If the examiner has any further questions regarding this amendment, he is invited to call applicants' attorney at the number listed below. The examiner is hereby authorized to charge any fees or direct any payment under 37 C.F.R. §§1.17, 1.16 to Deposit Account number 02-3038.

Respectfully submitted



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